

## ABSTRACT

Transformation hierarchies and effects trees may be defined in the same user interface by treating animated transformations as another type of time-varying data stream. Effects operators in the effect tree are provided with an input to receive a transformation. The effects operators can be set to either use a transformation having parameters specified by the user, or use an input transformation, or both. Transform operators may generate an output transform based on user specified parameters or based on a function of data input to the transform operator. If there is no input connected to a transform operator, the transform operator may generate its own local transform. In the user interface, the user can connect the output of one transformation operator to the next (e.g., parent to child) using the same output to input port connections as used for images and effects operators. The result of a graph of transformation operators is then visually connected to the input of the image processing (rendering or rasterizing) effect, such as a DVE, that is capable of using the final transformation. The user can then identify clearly which image effects are consumers of the transformation matrices. Using the data flow user interface, it also becomes possible to supply the same transformation as input to several image processing effects.